Assessing the relationship between Chinese capital flows and African debt sustainability

Michael Alfons Stemmer

Assessing the Relationship between Chinese Capital Flows and African Debt Sustainability*

Michael Alfons Stemmer†

June 2012

Supervisors: Jean-Claude Berthelemy & Xiangshuo Yin
Second Reader: Mathilde Maurel

Abstract

In a period where Western donors and economic powers are occupied with own domestic issues, China intensifies its economic ties with Africa. This paper sheds light on this engagement by evaluating the influence of financial capital flows from China on the debt sustainability and country risk of selected African countries. As such, sovereign bond ratings are estimated on several macroeconomic variables and included in a yield spread panel data framework in order to evaluate the external impact.

*I am very thankful to my supervisors Jean-Claude Berthélemy and Yin Xiangshuo for providing excellent guidance and advice throughout the elaboration of my thesis. I thank Mathilde Maurel for being the second reader. I am grateful to Wing Thye Woo for sharing with me his experience on debt sustainability measures. I am thankful for the invaluable support of Julia Möllenhoff. All the remaining errors are of course mine.

†Université Paris 1 Panthéon–Sorbonne & Fudan University

I Introduction

Chinese engagement on the African continent has already been existing for several decades. However, the involvement of China in African economies as well as the resources employed have reached new heights. The new emerged economic power is seemingly engaging in Africa on new terms; terms that are not shaped by traditional powers, nor perhaps even by Africans themselves. Particularly in a period where Western donors and economic powers are often occupied with their own domestic issues, China enlarges its field and intensifies economic ties. This paper tentatively wants to shed light on this engagement by evaluating the impact of financial capital flows from China on the debt sustainability and country risk of selected African countries.

The structure of the work is as following: Section II provides background information of the Sino-African liaison as well as on the reason for the countries chosen. Section III lays out the general theoretical framework. It commences with a short literature review on bond rating estimation techniques and and leads over to Part IV which introduces variables and the technical approach used to obtain a synthetic rating with which a quantification of Chinese financial flows on African countries debt sustainability, i.e. risk of default on debt is attempted. Section V tries to relate these bond ratings to bond spreads and checks for influence of Chinese capital flows and Section VI follows with a conclusion.

II Sino-African Economic Relations

The ties between modern China and Africa had already been established as recent as 1955 with the Bandung Conference as the first large-scale Asian-African meeting taking place in Indonesia. On May 30, 1956, China

established the first formal diplomatic relationship in Africa, with Egypt. Ever since, China has been fostering, cultivating and maintaining ties by spreading revolutionary ideology and offering economic and military support to its African friends, in particular when countries were cut off from official intergovernmental assistance due to dubious political regimes or political upheaval. However, China changed course in the 1980s. After adopting the open door policy, China has played down the role of political and ideological considerations, increased the weight on economic cooperation and development, and emphasized the principles of peaceful coexistence. According to Cheung, de Haan, Qian, and Yu (2011), China by 2010 has established a formal diplomatic relationship with 49 of the 54 countries on the African continent and conducts direct investments in 48 of these 49 countries.

The rising economic engagement and accompanying prominence of Chinese aid, export credits, and bank finance has produced both enthusiasm and concern among those concerned with development, as China's proclaimed non-interference in other countries' internal issues separates business from politics. Some believe that Chinese practices in official aid, preferential export credits, and other forms of development finance pose a significant challenge to the norms governing the international aid architecture. Others welcome the rise of a new development partner, one with seemingly deep pockets, and suggest that the Chinese might provide new leverage to countries faced with conditionality-based aid advocated by traditional donors (Braeutigam 2010). As the Forum on China-Africa Cooperation (2006) states, China's aid to and investment in Africa are typically unconditional, i.e. they do not tie to either political, economic, or governance reforms.

In the next paragraph, more information on Chinese actors as well as on lending purposes and structure will be provided.

1 Actors on the Chinese Side

As said before, ties between China and Africa have already reached a long-lasting tradition. China's rise to an economic super power during the last decade and the taking up of the role as advocate of the developing world have led to an intensification of these links through a variety of ways, ranging from academic exchange to currency swaps in order to increase the internationalization of the Renminbi. Yet, financial support of underdeveloped countries has been proved to be among the most successful and effective strategies.

Financial flows from China are mostly channeled through a vast number of institutions and are strategically devised by the Chinese government. Its willingness to large-scale investments in Africa are mainly driven by two factors: the hunger for commodities to fuel domestic economic growth, and the diversification of its investment portfolio loaded with billions of foreign exchange[1].

To secure energy and resource assets in order to hedge against rising commodity prices and possibly long-term supply shortages, the Chinese Government is encouraging its companies to secure an array of commodity assets (Davies 2010). Moreover, the presence of Chinese companies abroad is heavily supported by preferred credit lines from the government. Also Chinese banking institutions have been expanding their loan portfolios in Africa. This is true for both Chinese policy banks as well as for commercial lending institutions. Among principal lenders are the Chinese EXIM Bank for export-import financing, China Development Bank

[1]Despite of a shrink in foreign reserves for the first time since the Asian Financial Crisis in 1998 by about US$20.5 billion, the country still controls almost US$3.2 trillion of in official currency reserves (Rabinovitch 2012).

through its recently launched China-Africa Development Fund, China Construction Bank, as well as the Industrial Commercial Bank of China ICBC. (Davies 2010)

The characteristics of Chinese capital flows are quite subtle and aforementioned institutions contribute in several ways to an increasing amount of Sino-African financial streams. Financial flows to the African continent consist of an amalgam of outward direct investments (ODI), concessional loans or export buyer's credits and to all of them very little or no debt service requirements are attached. Unfortunately, explicit data on the structure of these flows is either scarce or sources are inconsistent and not really revealing.

These funds are provided on a non-conditional basis and are used for a myriad form of purposes, yet mainly developing finance in form of infrastructure [2]. According to the World Bank, Chinas investment commitments to infrastructure build in Sub-Saharan Africa was more than $US 7 billion in 2006 Chinas declared "Year of Africa". In the following year it committed a further $US 4.5 billion. Chinas investment in African infrastructure is often considered as being merely focusing on extractive sectors and tied to China interests that pertain to resource security. Yet, as Chinas investment in Africa both broadens geographically and deepens in financial commitment, China itself will increasingly have a vested interest in Africas long-term developmental success. While Africas GDP performance has been

[2]Infrastructure is the core of China Exim Banks undertakings, as approximately 80 percent of projects approved have involved infrastructural development. The China Exim Bank is increasingly making use of a deal structure - known as the "Angola model" or "resources for infrastructure" - whereby repayment of the loan for infrastructure development is made in terms of natural resources. While this approach is by no means novel or unique, and follows a long history of natural resource - based transactions in the oil industry - China has taken its implementation to a higher level (Executive Research Associates 2009).

robust in recent years, a major constraint on sustainable development has been the very poor state of the continents infrastructure system. The inability of economies to integrate themselves with neighbouring countries to promote wider markets continues to be a serious obstacle to trade. This reality has constricted the development of all sectors in Africa both primary and secondary. The logistical challenges that are imposed due to this serve to constrain the ability to transport products within the region and ultimately impede the formation of value chains for production. It is estimated that Africa requires at least $US 40 billion per annum to fund and maintain its existing core infrastructure capacity (Davies 2010).

According to the African Development Bank, China provided $US 4.5 billion in 2007 towards infrastructure projects, in many cases very sizeable scale projects. This is a major increase from $US 1 billion annually from 2001-2003, but down from a peak of $US 7 billion in 2007 (Renard 2011). Chinese involvement in Africas infrastructure is also on the increase. Whilst Africa specific data is not supplied, Chinas Ministry of Commerce reports that its international construction projects stood at a value of $US 7.96 billion in the first two months of 2009, up 24.8 per cent year-on-year despite the financial crisis (MOFCOM 2010).

In terms of the power sector, research into Chinese policy bank financing in Africa reveals that great focus is placed on hydropower projects, with approximately $US 5.3 billion being invested in this sector (Schiere and Rugamba 2011). For example, most dam projects undertaken by Chinese companies have a hydro-power dimension to them. In October 2008, SinoHydro concluded a loan agreement with the Ghanaian government for $US 562 million (Executive Research Associates 2009). The project valued at $US 660 million is to provide 400 MW of power to be distributed nationally and to neighbouring countries. It is estimated that almost two-thirds of Africa states have received finance from China mostly through

China EXIM Bank for thermal and hydro power projects in Africa. The World Bank states that Chinese funded projects will generate a power capacity of more than 6000 megawatts over a third of Africas currently existing hydropower generating capacity.

In the rail sector, Chinese financing commitments in Africa are reportedly standing at no less than $US 4 billion for rehabilitation of both old lines that were mostly damaged through conflict as well as new line construction. Large deals have been announced in Nigeria, Gabon and Mauritania. The Nigeria deal was out on hold after its change in government two years ago, but in October 2009 an agreement was signed to construct a railway line from the capital Abuja to Kaduna valued at $US 850 million and to be constructed over a three year period. In the realm of ICT, China EXIM Bank is providing finance for the supply of equipment hardware from leading firms such as ZTE and Huawei Technologies. Another World Bank estimate in 2008 finds that Chinese telecommunication firms have supplied over $US 3.2 billion worth of telecommunications equipment to Africa with particular reference to Ethiopia, Ghana, South Africa and Sudan (Schiere and Rugamba 2011).

2 Capital Flows and Economic Development

Orthodox literature circulates around mainly three points when discussing the role of FDI - reasons for company internationalisation strategies, determinants for investments abroad, as well as their impact of economic growth for the host country. Whereas the first factors for company strategy are mainly touched upon in business courses, the second stream focuses on capital allocation among different countries.

The third type looks more on the overall impact of capital inflows on the host country in terms of economic development, economic growth and

sustainability, and determines whether external financial flows contribute to it or not. For the purpose of this paper, the latter is considered to be the essence of the discussion.

Economic growth theory purports, and empirics show considerable evidence, that high investment rates are necessary for sustainable growth. However, in particular developing countries, where significant growth in domestic savings is absent, often may rely on foreign savings to boost domestic investment rates. In these countries the marginal productivity rate of capital may still be very high what makes them under normal circumstances very attractive for return-on-investment seeking foreign investors, given that the investment climate is not too risky in terms of political stability and the overall framework for conducting business.

That this is not always the case has been bitterly evidenced throughout the last decades and examples of conflict-ridden countries are myriad. Some exceptions can be found among resource blessed countries, particularly these offering windfall profits through crude oil exploitations. But often even there the risk of social upheaval and armed conflicts is omnipresent[3], sometimes fueled by religious and ethnic motives, terrorism or a even dubious role played by Western commodity exploitation contractors[4].

Thus, apart from the commodity extracting industry, Sub-Saharan Africa has until recently almost been completely cut off from international finan-

[3]According to the Uppsala Conflict Data Program, since 1946 Nigeria, for example, has experienced continuously interstate, intrastate, non-state and one-sided violence. With civilian rule taking over in 1999, inter-ethnic tensions heightened in Nigeria and a vast number of non-state armed conflicts erupted in the 2000s.

[4]According to an investigation by several non-governmental organization, Shell has allegedly contributed to armed conflicts in Nigeria trough funding of feudal militant groups (Smith 2011).

cial flows, despite of an urgent need for external finance due to very low domestic savings and low income levels. 'External capital is needed to supplement domestic savings in order to spur investment and growth' (Asiedu 2002: 107). This is where China comes into the play and the next paragraph attempts tracing China's steps on the African continent in order to identify the countries with the highest stakes in the investment portfolio.

3 The Countries

As with most investments taken, also the financial engagement in countries China is the most active is driven by the strategic return it yields for the central government, in financial and political terms. These investments, mainly in credit lines from aforementioned actors, are mainly provided in a form of FDI for infrastructure and have often a tremendous impact on economic growth for the respective countries or even the whole region (IMF 2011). Also following Berthelemy (2011), Chinese assistance has traditionally focused on countries with which it has good political relations and countries with oil and mineral resources. Let's have a closer look on the Chinese impact.

Weisbrod and Whalley (2011: 3) report that 'in the three years before the 2008 financial crisis, GDP growth in sub-Saharan Africa (averaged over individual economies) was around 6 percent, 2 percentage points above the mean growth in the preceding ten years. This period also coincided with significant Chinese foreign direct investment (FDI) flows into these countries, accounting for as much as 10 percent of total inward FDI for some countries'.

This development has even expanded during the recent financial crisis years up to today. Chinese capital flows to Sub-Saharan Africa amounted

to $US 64 million in the period 1979 to 2000. Yet, alone in 2003 Chinese FDI surpassed the inflow of the last 20 years with a by then peak level of $US 70.14 million. By 2007, financial flows reached the $US 1 billion threshold with climbing to new heights since then. Compared to overall international engagement on the African continent, China invests a relative high proportion of its capital outflows in Sub-Saharan Africa. Chinese capital flows accounted for around 5 percent of total Chinese outward investments over the period 2003-2009, whereas during the last three decades, roughly 2.05 percent of annual global FDI went to African countries below the Sahara (MOFCOM 2010).

Given the large number of African countries, we focus on the largest economies and the largest recipients of Chinese inward FDI. Particularly, we scrutiny in more detail six economies (Angola, Botswana, Niger, Nigeria, Sudan, and Zambia) where Chinese capital flows have had either considerable growth effects to their national economies or are major supplier of imports to the Chinese economy[5]. These six selected countries alone accounted for about 25.7 percent of overall African FDI in 2009, reaching even a higher level of 30 percent in 2010 (MOFCOM 2010).

The two figures below describe the situation for our six selected African countries quite intuitively. The Figure 1 displays developments in GDP, where according to the red-colored mean since the early 2000s some progress has been made on average, some countries are still lagging behind, others, like Botswana, have presumably accelerated their economic development and profit from stable economic and political conditions.

[5]Angola, e.g., as the third largest economy in Africa after Nigeria and South Africa, has surpassed Nigeria in August 2011 in terms of oil exports and occupies at the moment the position of leading oil supplier to China (Grill, B. 2011)

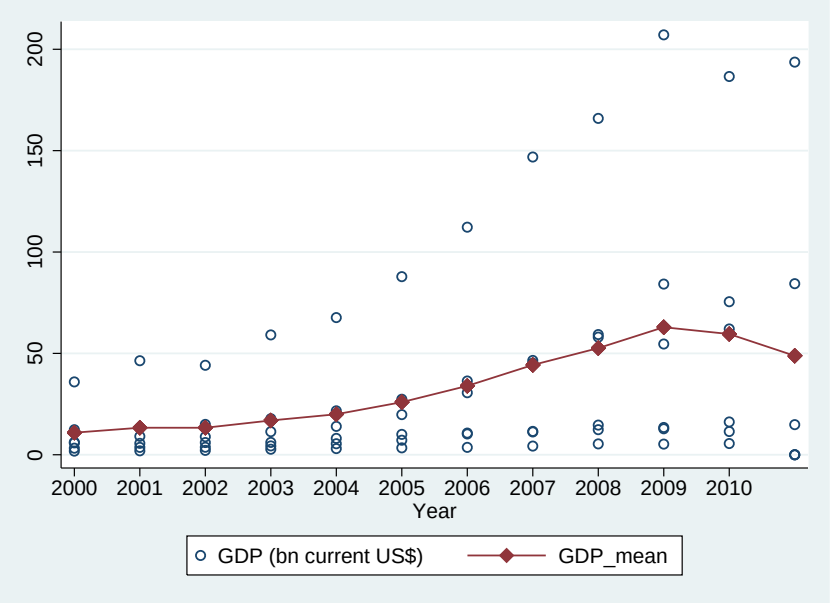

Figure 1: GDP Development

The debt service in Figure 2 compared to percentage of exports has been on a steady decline since the middle of the last decade and exhibits thus a counter movement compared to GDP growth rates. Generally speaking, the debt to export ratio has, except for the already sustainably operating Botswana, declined tremendously and the trend hints at further decrease after a small surge in debt figures due to the recent global economic crisis.

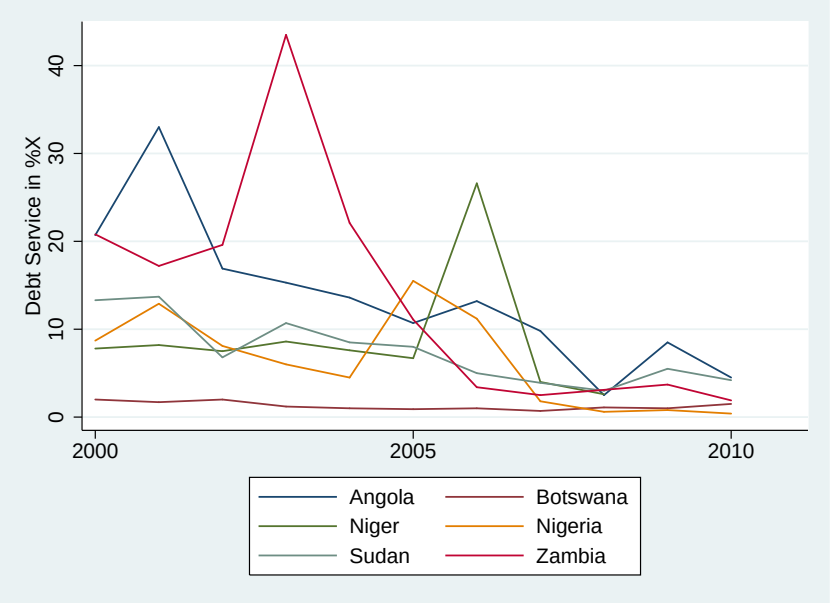

Figure 2: Total Debt Service (Percentage of Exports of Goods and Services, Income)

The overall picture looks pretty promising for the majority of the African countries. In the next large section it will be discovered how these rather positive figures translate into international market perceptions.

4 The Role of Currency Reserves

It is this concentration of funds in infrastructure together with the characteristic of being almost "free of charge" through preferred credit lines and export buyer's credits that give these financial flows for simplicity the quality of cheaply available foreign reserves. This assumption is not completely fallacious and related to the vast Chinese engagement in infrastructure construction described a few paragraphs earlier.

Literature suggests that reserves are held for both transaction and pre-

cautionary motives (Mendoza 2004). Particularly the transaction motive may apply in the assumption of "converting" Chinese capital flows, i.e. to a major part FDI, into currency reserves for the usage of transaction payments for infrastructure. Under normal circumstances, infrastructure projects would have been undertaken requiring a decrease of reserves in case of paying external contracting. This assumption is consistent with the a priori expectation as most African countries suffer from poor infrastructure and weak institutional environment. Corkin *et al.* (2008) thus argue that increased public investment in infrastructure is therefore a factor that stimulates private investment in these countries. With the provision of non-concessional loans and credits with an emphasis on infrastructure, China in a sense provides both finance and contractors to complete the operation, viz. supply and demand may be considered to come from the same source.

Also the success of Chinese companies in the African construction sector comes to no surprise, as they have already gained somewhat a competitive advantage in infrastructure supply. Given the rapid inroads that they have made in Africas construction industries in a short period of time, it is evident that Chinese companies have a degree of competitive advantage over other market players. The most important factors are access to capital, supply-chain costs and labour productivity, factors in which Chinese companies thwart every competitor (see e.g. Foster *et al.* 2008).

Having stated the theoretical foundations of the paper, it is now time to indulge in the outline of the empirical part in the next section.

III Empirical Methodology

'The movements in the sovereign bond spread of a particular country indicate changes in the expectations of the international financial markets about the probability of default by that country' (Woo 2000: 4).

A country's debt sustainability, or respectively its probability to default, is often measured by spreads, a parameter of international financial markets for the risk taken compared to safe assets. Conversely, sovereign credit ratings focus more on the domestic situation of the economy. However, both indicators are connected, what is the reason for a two-folded empirical part. I first try to estimate the sovereign credit ratings for countries that have not yet been granted a sovereign credit rating by an major rating agency, Fitch Ratings. Estimates are composed for every year based on macroeconomic variables, even though countries were not rated that frequent. The regression analysis is composed along cross-section as we want to find linear relations between the variables and the rating, not hypothesis testing.

The study focuses on country risk, not individual bonds characteristics. Therefore, data from World Bank staff calculations based on Datastream is employed, and not individual bond prices, as dependent variables. Specific bond characteristics, e.g. issue size, call feature or maturity, are not included as independent variables in the model.

Instead, this paper wants to rely on a model of "push" and "pull" factors originally employed to describe the reasons for capital flows from mature to low income countries (LIC). According to Fratzscher (2011), not as recently as the 2008 crisis has brought up the question of what has been driving both capital flows and ups and downs in their distribution what remains highly controversial. Some have stressed the importance of push factors, i.e. in particular monetary and fiscal policies in advanced

economies, as the main culprits behind this surge in capital flows. Conversely, others have emphasized pull factors, such as real divergences between emerging market economies and industrialized nations, as the main driver of the current pattern of capital flows. This framework has been used already several times in finance and macro literature. An often cited work by Montiel (2003) relates in a simple macro model these two factors by comparing an economy's domestic return factor with world costs of funds. In here, when employing push and pull factors, particular emphasis is put on the separation of domestic and international market factors. As it will be shown, sovereign credit ratings are based on mainly domestic factors pulling capital into a country, whereas international market factors push financial flows into a certain direction. Checks on the impact of variables on market sentiment will be introduced when dealing with bond spreads.

Compared to bond spreads as the dependent variable, I consider the debt-to-GDP ratio less suitable for the job, as it does not provides further insight about the sustainability of public financing. The ratio might be high, however, debt may be invested in profitable projects such as, for instance, education, which might be sustainable in the long run. Moreover, the conventional debt-to-GDP measure links debt, a future stock variable as it is paid back in the future, to a current stock variable as nominal GDP is not 'a debt duration-equivalent future nominal GDP' (Markovich 2011: 2). Thus, the sheer scale of the ratio may be misleading.

The next section starts our departure into the more technical aspects of this paper, first commencing with an overview of existing literature and techniques on the estimation of sovereign credit ratings as well as the presentation of the model used for providing the "pull" factor behind financial flows to countries. Later on, the bond rating estimates are implemented in the regression analysis checking for an impact of capital inflow on debt sustainability, i.e. the probability of default on foreign debt in the

selected African countries.

IV Determining Sovereign Credit Ratings

Rating agencies, due to their business practice, do not officially disclose the precise models used for their rating methodologies. A common practice among rating agencies is, for instance, to assign qualitative scores to several criteria and then arrive at a weighted average score. Beers and Cavanaugh (2005) provide an explanation of the criteria used by Standard&Poors. They list 44 variables grouped under 10 categories political risk, income and economic structure, economic growth prospects, fiscal flexibility, general government debt burden, off-budget and contingent liabilities, monetary flexibility, external liquidity, public sector external debt burden, and private sector external debt burden. Both the scoring and the weights used to arrive at the final average rating are influenced by subjective judgment of the rating analysts. Therefore, many critics argue that country risk ratings should not be determined by mechanical models due to their presumed randomly assigned weights and variables involved.

Nevertheless, many researchers have found that the ratings by major agencies can be explained to a large extent by a handful of macroeconomic variables. Ratha *et al.*(2011) provide a brief overview of hitherto done work. Lee (1993) estimated a linear regression model with panel data for 40 developing countries for 1979-87 using growth, inflation, growth volatility, international interest rates, industrial countries growth rate, debt to exports ratio, and dummies for geographical location as explanatory variables for ratings. In an often-cited article, Cantor and Packer (1996) used a cross-sectional regression model of sovereign credit ratings as a function of per capita income, GDP growth, inflation, fiscal balance and external balance, external debt, default history, and an indicator for the

level of economic development. This study used a cross-section of high income and developing countries, a short coming of the work we come back later. Rowland and Torres (2004) estimated a similar model using pooled time-series and cross-section data to identify the determinants of sovereign ratings and spreads. Ferri, Liu and Stiglitz (1999) employed a similar model to examine whether ratings were procyclical during the Asian crisis by comparing predicted with actual ratings and draw conclusions on how estimations should be done afterwards. Reinhart *et al.*(2003) estimate similar cross-section and panel regression models for evaluating debt intolerance, the duress that many emerging market countries experience at debt levels that would seem manageable by industrial country standards.

Another article, almost as often cited as Cantor and Packer, is written by Sutton (2005) who used an instrumental variable estimation in order to tackle the potential reverse causality that runs from ratings to debt burdens. Yet he found little evidence of reverse causality, and concluded that ordinary least squares (OLS) may be the most appropriate technique.

As it has been discovered, a common finding from this set of papers is that sovereign ratings can be explained to a significant extent by a handful of macroeconomic variables. In trying to develop a model for predicting sovereign ratings, we proceed in the following manner. First, sovereign ratings for the rated developing countries as a function of several macroeconomic variables are estimated. Later on, the econometric model is used to predict ratings for developing countries that did not have a rating.

1 Data and OLS

For setting up an accurate model for rating prediction, we rely on the real credit ratings from Fitch Ratings due to the availability of data. In the

model, credit ratings taken are the long-term foreign currency debt ratings assigned to a sample of initially 31 national sovereign governments[6] that have been rated as of late 2011. Yet, in order to rank the ratings and use them as our dependent variable, the letters need to be transformed into a numerical equivalent according to the Fitch debt rating classification. As in the scale described in Table 1 below, the top rating "AAA"for highest credit quality becomes equal to 1 and 21 denotes the lowest rating "C" in the category "Very high default risk". Ratings below this threshold are not taken into consideration as reasons for actual default cannot precisely pinpointed and may be derived from a variety of causes ranging from deep structural problems in public finances or the domestic economy to the simple unwillingness of a country to service its debt even before the default (e.g. Baer *et al.* 2009).

The subsequent Table 1 offers a description of Fitch ratings translated into a numeric scale.

[6]The sovereign ratings available were those from the countries of Angola, Australia, Azerbaijan, Bahrain, Brazil, Chile, China, Colombia, Costa Rica, Czech Republic, Dominican Republic, El Salvador, France, Georgia, Iceland, Japan, Korea, Namibia, New Zealand, Nigeria, Peru, The Philippines, Romania, Seychelles, South Africa, Sri Lanka, Thailand, Turkey, Uganda, United States and Zambia

Table 1: Sovereign Ratings: Conversion from Letters to Numeric Grades

	Fitch Ratings[a]	Numeric Expression
Investment Grade		
Highest Credit Quality	AAA	1
Very High Credit Quality	AA+	2
	AA	3
	AA-	4
High Credit Quality	A+	5
	A	6
	A-	7
Good Credit Quality	BBB+	8
	BBB	9
	BBB-	10
Speculative Grade		
Speculative	BB+	11
	BB	12
	BB-	13
Highly Speculative	B+	14
	B	15
	B-	16
High Default Risk	CCC+	17
	CCC	18
	CCC-	19
Very High Default Risk	CC	20
	C	21

[a] Sources: Fitch Ratings

In order to estimate the ratings for our hitherto unrated countries under closer scrutiny, a regression is set up based on the numeric rating equivalents from the table above. The regression tries to model ratings as of year $t = 2011$ as a function of lagged explanatory variables for $t-1 = 2010$. Lagged values of the explanatory variables are used instead of contemporaneous ones in order to limit potential reverse causality between dependent and explanatory variables. The technique employed is ordi-

nary least squares (OLS) for a cross-section of available ratings, following the above literature on modeling sovereign credit ratings (e.g. Cantor and Packer 1996, Sutton 2005 and more recently e.g. Canuto *et al.* 2011).

The obtained numeric ratings will then be regressed on a number of independent variables.

Table 2: Description of Independent Variables

Variable Name	Definition of Data Sources	Unit of Measurement[a]	Data Sources
GNI	Gross National Income per Capita in 2010	Thousand Current US$	World Bank Development Indicators, IMF World Economic Outlook 2010, EuroStat
GDPGrowth	Average annual real GDP Growth Rate in 2010	Percent	World Bank Development Indicators, IMF World Economic Outlook 2010, EuroStat
Inflation	Average annual consumer price inflation rate in 2010	Percent	World Bank Development Indicators, IMF World Economic Outlook 2010, EuroStat
Liquidity	Indicator for short-term liquidity [Foreign Reserves / (Short-term debt + Imports)][7], 2010	Percent	World Bank Development Indicators, IMF World Economic Outlook 2010, EuroStat, ADB
DebtExports	Public and Publicly Guaranteed (PPG) External Debt over Exports of Goods and Services, 2010	Percent	World Bank Development Indicators, IMF World Economic Outlook 2010, EuroStat, ADB
CPI	Indicator for institutional quality, Corruption Perception Index of Transparency International in 2010	Corruption Perception Range from 1 to 10	Transparency International Corruption Perception Index 2010

Note: IMF = International Monetary Fund, ADB = Asian Development Bank

[a] GNI, DebtExports and CPI are transformed to natural logarithm in the regression analysis

[7]The rule is named after Pablo Guidotti, Argentine former deputy minister of finance, and Alan Greenspan, former chairman of the Federal Reserve Board of the United States. Guidotti first stated the rule in a G-33 seminar in 1999, while Greenspan widely publi-

Having stated the variables we intend to use for estimating sovereign ratings, this section will relate our independent variables to the regression in terms of potential impact on the numeric rating equivalents defined previously in Table 1. However, one has to mention that rating agencies such as Fitch, Moody's, or Standard & Poor's define several criteria for evaluating a country's ability and willingness to service its debt. Although some information on these decision parameters is disclosed, many factors are still difficult to evaluate or simply not quantifiable and agencies provide little guidance on the weight these variables play in country risk analysis. The approach undertaken in this work is based on the following variables:

- *GNI.* Income per capita is considered as the main variable measuring economic development. The better developed a country is and the higher its per capita income, most likely the more politically stable is the country which positively affects the economic environment. This may favour the potential tax base which provides the sovereign with greater tax incomes rendering it more able to repay debt. Given our rating scale aforementioned, the coefficient should have a negative sign with higher GNI per capita leading to better ratings, i.e. lower numerical grades.

- *GDPGrowth.* A relatively high rate of economic growth suggests that a countrys existing debt burden will become easier to service over time. Again, this variable also may act as a proxy for political stability and economic potential signaling a favourable economic environment. We expect the real growth rate of GDP to behave in a similar way as per capita income.

- *Inflation.* A high rate of inflation points to structural problems in a

cized it in a speech at the World Bank (Greenspan 1999). Guzman Calafell and Padilla del Bosque (2002) found that the ratio of reserves to external debt is a relevant predictor of an external crisis.

country's public finances. A government resorting to inflationary monetary policy at least appears unable or unwilling to pay for current budgetary expenses through taxes or debt issuance. Moreover, public dissatisfaction with inflation may in turn lead to political instability. The coefficient for inflation should be positive as a higher inflation rate should lead to a deteriorating credibility in the ability to pay back sovereign debt.

- *Liquidity.* The liquidity variable is a combination of the now so-called Greenspan-Guidotti rule and the former conventional wisdom that foreign reserves should cover at least three months of imports. This independent variable provides an indicator for a country's short-term foreign currency liquidity condition with the rational to resist a massive withdrawal of short-term foreign capital (Ferri *et al.* 1999). The prevalence a sudden capital withdrawal may in particular be an assumption for low-income and developing countries with a promising economic outlook but a risk for severe disturbances. As some of the countries used in the regression belong to this domain, including the African countries of emphasis in this work, this variable in considered to play an important role in determining sovereign credit ratings. Accordingly, the variable should be negatively denoted as larger currency reserves avoid short-term insolvency and thus have a positive impact on the sovereign credibility.

- *DebtExports.* A higher percentage of public and publicly guaranteed external debt over exports indicates a higher debt burden for the sovereign what should correspond to a higher probability of default. This ratio may also give hints on external competitiveness as the ratio increases with foreign currency debt on the rise and a decline in exports. Hence, the higher the ratio of PPG debt over exports, the lower the sovereign rating, which is indicated by a positive coefficient.

- *CPI.* Economic growth theory recognizes functioning institutions as one of the main sources influencing the prosperity of a country. The Transparency International Corruption Perception Index (CPI) works as a proxy for institutional quality and the rule of law and may provide insights into the effectiveness of a country's bureaucracy. Good or bad perceptions in turn have an impact on the overall business environment for foreign investments influencing economic growth as well as provide signals for the sovereign tax receipts. The CPI coefficient should then be negative as less corruption yields a better credit rating.

2 Results and Interpretation

Before reporting estimates, awareness about some frictions regarding the data in the model employed needs to be raised. Apart from the lack of consistent data for some countries, it is also advisable to avoid the influence of fixed effects and selection biases among the countries chosen. In order to avoid the latter and to make our model more fitting for the African countries, we exclude all advanced countries from the sample[7], what makes us ending up with 20 less developed countries mainly from Asia and Latin America.

Table 3 reports the OLS estimates of the previously stated parameters for our sample of the 20 most recently rated countries to create a benchmark the shadow ratings for our targeted African countries can be based upon[8]. Concerning the sample estimates, the theory discussed above would seem to receive substantial support from the data. Per capita income, institutional quality, inflation rate as well as the liquidity and external debt variables are all statistically significant, and our important liquidity vari-

[7]With dropping developed countries, we avoid a shortcoming of the Cantor and Packer (1996) model. Yet, data may still be subject to minor biases in country selection.

[8]The respective Stata output has been attached to the document in the Appendix.

able is significant at the 1 percent level. Moreover, all of the significant variables have the expected signs. Furthermore, the explanatory power of the regression is high; the adjusted R-squared statistic is just above 0.81 and consistent with other studies on that topic.

Table 3: OLS Estimates

Constant	GNI	CPI	Inflation	Liquidity	DebtExports	GDPGrowth
14.303***	-1.704**	-1.28**	0.127**	-0.042***	0.368**	0.052
(8.91)	(3.01)	(2.52)	(2.93)	(4.47)	(2.16)	(1.04)

Note: Absolute values of t-Statistics are reported in parentheses

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Other variables used such as e.g. Gross Government Debt, are not significant, neither is GDPGrowth which exhibits also the wrong sign. Explanations for this quite subtle result may be that mere GDP growth rates have not much to say about the structural underpinnings of an economy. Particularly resource abundant countries often heavily rely on only one export good, what drives resources into the commodity extraction sector and prevents them from being used sustainably elsewhere.
Heteroscedasticity and multicollinearity among variables are not exhibited according to respective test statistics[9].

It is plausible that some of the coefficients may be inconsistent and causality may be confounded in this regression due to potential presence of reverse causality from ratings to some of the explanatory variables. In other words, income per capita or the corruption index may itself depend

[9]Very low *Chi2* does not hint at presence of heteroscedasticity; *VIF*-Statistics $\leqq$ 20 and *1/VIF*-Statistics $\geqq$ 0.5 does not provide evidence for multicollinearity

on ratings. There are two reasons why this may not present serious difficulties for our purpose. First, this is a cross sectional study and we have deliberately used lagged data for all the independent variables, instead of contemporaneous values. Second, our purpose is to use the regression model as a best linear predictor of ratings, rather than for hypothesis-testing. In a cross section, this method gives reasonably good results.

The previous assumptions stated, each independent variable is multiplied by the appropriate coefficient and values are summed on the individual country level to produce a numeric value serving as a proxy for sovereign credit quality or the respective hitherto not obtained credit rating. As we can see in the following table comparing real ratings with estimated ones, the regression is quite an accurate predictor of sovereign credit ratings with a difference of one notch in the majority of cases:

Table 4: Comparison of Actual and Predicted Ratings as of 2011

Country	Sovereign Rating[a]	Shadow Rating
Angola	BB-	BB - BB+
Nigeria	BB-	B+ - BB-
Turkey	BB+	BB - BB+
El Salvador	BB	BB+

[a] Sources: Fitch Ratings

The next section follows with revealing the impact of capital inflows on bond spreads.

V Evaluating the Impact of Capital Inflows on Bond Spreads

After having found already a clear influence of capital flows on the first sustainability determinant, it is now attempted to determine an impact on bond yield spreads through employing the previously obtained shadow ratings.

In order to gain a first feeling on how ratings and yield spreads are connected, the calculation of the non-parametric Spearman's rank correlation coefficient might be considered useful. The result of the test output (see Appendix) is not surprising, as there is a positive correlation between the two, although very loosely with a Spearman's $\rho = 0.1386$. This result confirms both intuition and logic that a lower ranking, viz. a higher numerical equivalent, yields a higher spread on the bond market.

A conventional approach to modeling equilibrium sovereign yields is to assume that the spread over a risk-free interest rate is a function of the probability of default of a country, here proxied by previously obtained shadow ratings, and of the loss given default. In reduced-form models, this probability of default is exogenously determined and is tied to the sustainability of a given level of external debt through liquidity or solvency indicators, and hence to a set of macroeconomic fundamentals. For example, assuming risk neutral lenders and competitive financial markets, and following the standard model of risk premia, we might follow e.g. Edwards (1984) and employ, according to our theoretical underpinning, the following regression as a panel data model with spreads as the dependent variable:

$$s_{i_t} = \alpha + \sum_{j=1}^{J} \beta_{j_{i_t}} x_{j_{i_t}} + \epsilon_{i_t}$$

where s_{i_t} is the yield spread of country i at time t, α is an intercept coefficient, the β_js are slope coefficients, the x_js are a set of J international market variables as "push" factors as well as our previously obtained shadow rating estimate as a "pull" factor, ϵ are i.i.d. error terms. In other more complex frameworks, e.g. Sachs (1981) arrive at similar findings.

1 Time Frame Considerations

Beck (2001) emphasizes the distinction of different time horizons for the estimation. Whereas short-term spread fluctuations are mainly driven by daily demand and supply factors, technical aspects as well as political news, they do not have effects on a country's credit standing or probability of default in the long run as macroeconomic variables seem rarely influenced by short-lived news. Our focus lies in the long-term time horizon of a year-to-year period, where impacts of events at short notice are considerably smoothed out or are entirely without any effect on deterministic macroeconomic variables.

Estimation sovereign bond spreads via shadow bond ratings, the ratings are expected to be significant, since both of them are a measure of sovereign risk. However, if the sovereign spreads and ratings refer to the same thing, which is the probability that a country defaults on its debt, they may have some common determinants and reverse causality may thus arise as a problem. Yet, the reason why this probability may be low, is that while ratings are a long-term assessment of the sovereign risk, sovereign spreads can provide more precise point-in-time measures of the sovereign risk. The here employed World Bank Data on spreads[10] are arithmetical averages of monthly spread values where long-run cycli-

[10]Here we use World Bank data instead of relying on J.P Morgan's EMBI+ Index due to non-availability of data as well as a heavy bias of the index towards Latin American countries (Sy 2002).

cal impacts are mitigated.

2 Panel Data Analysis

As evidenced by Rowland and Torres (2004), a panel data approach takes into account both the heterogeneity of the countries and the variables which are constant over time. This advantage of the panel data is one reasons why time series or a cross-sectional analysis is not used. Also, the panel data approach copes better with the problem of collinearity. Multicollinearity is troublesome when it comes to time series analysis and when it comes to macroeconomic variables of the kind employed in this research.

For the panel data regression 9 countries are used, again out the emerging economies pool[11]. Also here shadow ratings are estimated accordingly in order to keep variable sizes concise with previous estimations. Data availability for the selected countries is perfect, we yield a strongly balanced panel. As it has already been stated, the check for influence of capital flows through the reserve variable on spreads relies on the aforementioned push - pull model for financial flows. The independent variable catching domestic effects has been estimated, the shadow bond ratings. Furthermore, two theoretically ideal variables for catching for international interest rates and international market sentiment are used. Annual variations of the VIX[12], the Chicago Board Options Exchange Market Volatility Index measuring the implied volatility of S&P 500 index options, are computed, as well as the annual LIBOR rate, the London Interbank Offered Rate, is taken as a proxy for international interest rates.

[11] Countries this time employed are Brazil, Chile, Colombia, El Salvador, Nigeria, Peru, Philippines, South Africa, Turkey.

[12] For a brief description of the VIX as an indicator for market sentiment, i.e. financial market uncertainty, see Dueker (1999). An alternative index could be the NASDAQ.

The estimation is specified as a fixed effects model. This specification can be considered as appropriate if we expect country-specific intercepts to reflect different levels of spreads exhibiting time-invariant factors and if the assumption goes that no random process has led to these intercepts in the sample. According to Beck (2001: 14), 'fixed effects in this model then represent structural solvency variables'. This assumption can be verified by using the Hausman test for either taking a fixed or a random effect model. It basically tests whether the unique errors ϵ_{it} are correlated with the independent variables, the null hypothesis rejects this assumption (Green 2008). By contrasting fixed effects estimation and random effects estimation, Prob>chi2 = 0.0331 and thus significantly lower than 5 percent what leads to a fixed effects model.

VI Results and Interpretations

The first executed regression with all variables included provides us with a highly significant sovereign rating variable for domestic effects with the right positive sign for the coefficient, given the scaling of our rating equivalents from small numbers for excellent ratings deteriorating to higher figures. This goes in line with the previous Spearman test result, where higher numeric equivalents yield higher bond spreads. Unfortunately, all international market variables are highly insignificant. Yet, this may be explained through the availability of global liquidity and well interlinked global financial markets which become theoretically more and more efficient in distributing resources and thus cater towards an alleviation of risks and fears of market actors.

Testing for groupwise heteroscedasticity via the Wald test, the null hypothesis is rejected and heteroscedasticity thus present. This will be taken care of with using robust standard errors. Serial correlation tests apply to

macro panels with long lasting time series and are not considered to be a problem in micro panels (under 20 - 30 years) (Hoechle 2007). Results can be found in the table below (Stata output as always in the Appendix):

Table 5: Within Panel Data Regression

Constant	Rating	VIX	LIBOR
-126.3111^{**}	70.08901^{**}	-4.345754	4.546114
(2.63)	(3.15)	(1.23)	(0.60)

Note: Absolute values of t-Statistics are reported in parentheses

Note: All independent variables are transformed into natural logarithms

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Results remain consistent with the previous regression, even though variables face a slight deterioration in significance. However, the well below the 5 percent level significant Rating variable exhibits also here a positive coefficient. A rating downgrade indicates deterioration in macroeconomic stability and external sustainability of a given economy, and subsequently an increase in spreads.

Having our independent variables transformed into natural logarithms, interpretation says that a one percent increase in the independent variable increases (or decreases) the dependent variable by (coefficient/100) units. This implies for the Ratings that a 1 percent increase in the sovereign rating results in an increase of .7 units in the spread[13]. With the insertion of a Chinese ODI figure into the liquidity variable above, the impact on bond spread evaluation of capital flows, our previous assumptions provided,

[13]In order to provide a relation, according to Reuters, Greek 10-year government bonds moved to a spread level 614 basis points higher compared to the German benchmark on April 26, 2010.

can be evaluated. A multiplication of the liquidity variable with the Rating variable of the panel data finally allows us to estimate the impact on bond spreads as well. Despite of being quite a small number, the results of this paper may find at least a slight positive impact on spreads originating from Chinese capital flows.

VII Conclusion & Shortcomings

After estimation results have been outlined, shortcomings of the models employed cannot be kept undisclosed. Admittedly, the paper suffers from some inconsistencies, mainly arising due to lack of data ranging from only a limited amount of rated countries given the intention not to mingle developing and industrialized countries. Even though the selection of countries has been cautiously pursued, selection bias cannot be entirely avoided what may distort results obtained. Of course, with a larger sample estimation results become more accurate and may yield to an even higher goodness of fit. Moreover, as it has already been stated, it is plausible that some of the coefficients may suffer from reverse causality from ratings to some of the explanatory variables. Reverse causality has been tried to stay low through a lag in data collection. Yet, this may not be enough and a suggestion could be to lag data twice in order to increase the chance of complete randomness without any reverse influence.

A major issues is certainly in both regressions the rather limited amount of independent variables at hand. Omitted variable bias can certainly be alleged in the panel data, even though variables for international market sentiment are not that frequent. However, many countries rely heavily on the export of commodities[14], what might entice someone to include an in-

[14]Main commodities exported: Oil (Angola, Nigeria, Sudan), Diamonds (Botswana), Uranium (Niger), Copper (Zambia) (Bond 2006)

dex on commodity prices in order to catch this impact on spreads. Slow world growth may tighten international capital availability and may lead to lower export growth in developing countries. Additionally, high oil prices may lower a countrys external competitiveness and cause a deterioration of the trade balance. This may lead to an increased demand for foreign capital in oil importing countries, and possibly cause a balance of payment crisis. Certainly, there are many more suggestions on the above models employed and inclusion of some may be treated somewhere else.

Yet, the paper provides some important insights. From the point of view of policy makers, sovereign ratings and with their significance in the regression also bond spreads can be improved by relying on a rather small sample of macroeconomic variables. If the achieve to steadily improve, e.g. income per capita and the liquidity ratio, markets and rating agencies most likely will award their efforts and access to capital markets become easier and particularly cheaper when spreads are reduced. Moreover, it has been discovered that even though quite small, Chinese capital flows may have a positive impact on both ratings and spreads. Whether this development is sustainable in the long-run, apart from the construction of infrastructure and cheap loans, is a different question and will be kept for future research.

A Appendix

Regression and test tables for the sovereign rating estimation:

Source	SS	df	MS	Number of obs =	20
				F(6, 13) =	14.70
Model	147.986784	6	24.664464	Prob > F =	0.0000
Residual	21.8132162	13	1.67793971	R-squared =	0.8715
				Adj R-squared =	0.8122
Total	169.8	19	8.93684211	Root MSE =	1.2954

Rating	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
logGNI	-1.703548	.5665619	-3.01	0.010	-2.927531	-.4795658
Liquidity	-.0424238	.0094906	-4.47	0.001	-.0629271	-.0219205
Inflation	.1268039	.0432134	2.93	0.012	.0334471	.2201607
logCPI	-1.283579	.5103557	-2.52	0.026	-2.386135	-.1810223
logDER	.3682384	.1700952	2.16	0.050	.0007702	.7357067
GDPGrowth	.0520848	.0502196	1.04	0.319	-.056408	.1605776
_cons	14.30301	1.605664	8.91	0.000	10.83419	17.77184

Figure 3: OLS Rating Estimation

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of Rating

         chi2(1)      =     0.00
         Prob > chi2  =   0.9902
```

Figure 4: Test for Heteroscedasticity

Variable	VIF	1/VIF
logCPI	1.63	0.612187
logGNI	1.61	0.620122
GDPGrowth	1.12	0.892148
Liquidity	1.12	0.893296
Inflation	1.11	0.899491
logDER	1.02	0.976743
Mean VIF	1.27	

Figure 5: Test for Multicollinearity

Tests and Panel Data for Bond Spread Regression:

```
 Number of obs =      99
Spearman's rho =      0.1368

Test of Ho: spread1 and sovereignrating are independent
    Prob > |t| =      0.1770
```

Figure 6: Spearman Rank Correlation Coefficient

	Coefficients (b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Rating	70.08901	34.1106	35.97841	12.17713
VIX	-4.345754	-4.213484	-.1322703	.
LIBOR	4.546114	6.672003	-2.125889	.

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 8.73
Prob>chi2 = 0.0331
(V_b-V_B is not positive definite)

Figure 7: Hausman Test for fixed or random effects

Fixed-effects (within) regression — Number of obs = 99
Group variable: country1 — Number of groups = 9

R-sq: within = 0.1613 — Obs per group: min = 11
between = 0.0510 — avg = 11.0
overall = 0.0289 — max = 11

F(3,87) = 5.58
corr(u_i, Xb) = -0.6250 — Prob > F = 0.0015

spread1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Rating	70.08901	19.57086	3.58	0.001	31.18981	108.9882
VIX	-4.345754	4.431577	-0.98	0.329	-13.15399	4.462485
LIBOR	4.546114	4.579406	0.99	0.324	-4.555952	13.64818
_cons	-126.3111	46.62378	-2.71	0.008	-218.9809	-33.6413
sigma_u	19.632719					
sigma_e	25.582412					
rho	.37065329	(fraction of variance due to u_i)				

F test that all u_i=0: F(8, 87) = 3.68 — Prob > F = 0.0010

Figure 8: Within Panel Regression

Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (9) = 50.51
Prob>chi2 = 0.0000

Figure 9: Modified Wald Test for Heteroscedasticity

Fixed-effects (within) regression — Number of obs = 99
Group variable: country1 — Number of groups = 9

R-sq: within = 0.1613 — Obs per group: min = 11
between = 0.0510 — avg = 11.0
overall = 0.0289 — max = 11

F(3,8) = 10.92
corr(u_i, Xb) = -0.6250 — Prob > F = 0.0034

(Std. Err. adjusted for 9 clusters in country1)

spread1	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
Rating	70.08901	22.2696	3.15	0.014	18.73522	121.4428
VIX	-4.345754	3.519079	-1.23	0.252	-12.46076	3.769256
LIBOR	4.546114	7.543486	0.60	0.563	-12.8492	21.94142
_cons	-126.3111	47.94792	-2.63	0.030	-236.8792	-15.74302
sigma_u	19.632719					
sigma_e	25.582412					
rho	.37065329	(fraction of variance due to u_i)				

Figure 10: Within Panel Regression with Robust Standard Errors

B Bibliography

References

[1] Baer, W., Margot, D. and G. Montes-Rojas. 2009. "Argentinas Default and the Lack of Dire Consequences". *Department of Economics Discussion Paper Series*, No. 10/09. City University London, School of Social Sciences.

[2] Beck, R. 2001. "Do Country Fundamentals Explain Emerging Market Bond Spreads?". *CFS Working Paper No. 2001/02*. Frankfurt am Main: Johann Wolfgang Goethe-University.

[3] Beers, D. and M. Cavanaugh. 2005. *Sovereign credit ratings: A primer*. New York: Standard and Poors.

[4] Berthelemy, J-C. 2011. *"China's Engagement and Aid Effectiveness in China"*. In: "China and Africa: an Emerging Partnership for Development?", by R. Schiere, L. Ndikumana, and P. Walkenhorst (eds.). Tunis: African Development Bank.

[5] BIS. 2009. "Capital Flows and Emerging Market Economies". *CGFS Papers No. 33*. Basel: Bank for International Settlements.

[6] Braeutigam, D. 2010. *"China, Africa and the International Aid Architecture"*. Working Paper Series No. 107. Tunis: African Development Bank.

[7] Bond, P. 2006. "Resource Extraction and African Underdevelopment". *Capitalism Nature Socialism*, Vol. 17(2): 5-25.

[8] Calafell, G. J. and R. Padilla del Bosque. 2002. The ratio of International reserves to short-term external debt as an indicator of external vulnerability: some lessons from the experience of Mexico and other emerging economies. *G-24 Research Papers*.

[9] Canuto, O., Mohapatra, S., and D. Ratha. 2011. "Shadow Sovereign Ratings". *Economic Premise*, No. 63. Washington, D.C.: World Bank.

[10] Cantor, R. and F. Packer. 1996. "Determinants and Impact of Sovereign Credit Ratings". *Federal Bank of New York Economic Policy Review*. New York.

[11] Cheung, Y. W., de Haan, J., Qian, X. W., and S. Yu. 2012. "China's Outward Direct Investments in Africa". *Journal of International Economics*, Vol. 20(2): 201-220.

[12] Corkin, L., Burke, C., and M. Davies. 2008. "Chinas Role in the Development of Africas Infrastructure". *SAIS Working Papers in African Studies 04-08*. The Johns Hopkins University, Washington D.C.

[13] Davies, M. 2010. *"How China is influencing Africa's Development"*. OECD Development Centre. Background Paper for the Perspectives on Global Development 2010 Shifting Wealth.

[14] Dueker, M. J. 1999. "A Barometer of Financial Market Uncertainty". *Monetary Trends*. The Federal Reserve Bank of St. Louis.

[15] Edwards, S. 1984. "LDC foreign borrowing and default risk: an empirical investigation, 1976-80". *American Economic Review*, Vol. 74(4): 726-34.

[16] Executive Research Associates. 2009. *"China in Africa - A Strategic Overview"*. Craighall, South Africa.

[17] Ferri, G., Liu, L. G. and J. E. Stiglitz. 1999. "The Procyclical Role of Rating Agencies: Evidence from the East Asian Crisis". *Economic Notes by Banca Monte dei Paschi di Siena SpA*, No. 3: 335-355.

[18] Forum on China-Africa Cooperation. 2006. *China's African Policy*. $http://www.focac.org/eng/zfgx/dfzc/t481748.htm$. (Accessed: 2012/03/12).

[19] Foster, V., Butterfield, W., Chen, C. and N. Pushak. 2008. "BUILDING BRIDGES: CHINAS GROWING ROLE AS INFRASTRUCTURE FINANCIER FOR SUB-SAHARAN AFRICA". *Trends and Policy Options No. 5*, forthcoming. Washington, D.C.: World Bank.

[20] Fratzscher , M. 2011. "Capital Flows, Push versus Pull Factors and the Global Financial Crisis". *ECB Working Paper*. Frankfurt: European Central Bank.

[21] Green, W. H. 2008. *"Econometric Analysis"*. Prentice Hall.

[22] Greenspan, A. 1999. Currency reserves and debt. Speech before the World Bank Conference on Recent Trends in Reserves Management. Washington, D.C.

[23] Grill, B. 2011. "Angola: Dubai in Afrika". ZEIT Online. $http://www.zeit.de/2011/40/Angola$. (Accessed: 2012/02/21).

[24] Hoechle, D. 2007. "Robust Standard Errors for Panel Regressions with Cross-Sectional Dependence". *The Stata Journal*, Vol. 7(3): 281-312.

[25] IIF. 2011. *"IIF Research Note: Capital Flows to Emerging Market Economies"*. Washington D.C.: Institute of International Finance.

[26] IMF. 2010. *"Beyond Aid: How Much Should African Countries Pay to Borrow?"*. Washington D.C.: International Monetary Fund.

[27] IMF. 2011. *"Regional Economic Outlook - Sub-Saharan Africa: Recovery and New Risks"*. Washington D.C.: International Monetary Fund.

[28] Lee, S. H. 1993. "Are the credit ratings assigned by bankers based on the willingness of LDC borrowers to repay?". *Journal of Development Economics*, Vol.40(2): 349359.

[29] Markovich, M. 2011. "Debt sustainability measures and their explanatory power for estimating government bond yields: A panel

data analysis". Term Paper prepared for 390039 UK PhD-E Econometric Methods for Panel Data, University of Vienna.

[30] Mendoza, R. U. 2004. International reserve-holding in the developing world: self insurance in a crisis-prone era?. *Emerging Markets Review*, Vol.5: 61-82.

[31] MOFCOM. 2010. *"2010 Statistical Bulletin of China's Outward Foreign Direct Investment"*. Ministry of Finance and Commerce of the People's Republic of China.

[32] Montiel, P. 2003. *"Macroeconomics in Emerging Markets"*. Cambridge University Press.

[33] Rabinovitch, S. 2012. *Chinese foreign exchange reserves shrink*. Financial Times Online. $http : //www.ft.com/intl/cms/s/0/b496aee8 - 3dcf - 11e1 - 91ba - 00144feabdc0.htmlaxzz1ucimzS6t$. (Accessed: 2012/03/21).

[34] Ratha, D., De, P. K., and S. Mohapatra. 2011. "Shadow Sovereign Ratings for Unrated Developing Countries". *World Development*, Vol.39(3): 295-307.

[35] Reinhart, C. M., Rogoff, K. S. and M. A. Savastano. 2003. "Debt intolerance". *Brookings Papers on Economic Activity*, Vol.1: 175.

[36] Renard, M. F. 2011. "China's Trade and FDI in Africa". *Working Paper Series*, No. 126. Tunis: African Development Bank.

[37] Rowland, P. and J. L. Torres. 2004. "Determinants of Spread and Creditworthiness for Emerging Market Sovereign Debt: A Panel Data Study". *Borradores de Economia*, Vol. 295. Colombian Central Bank.

[38] Sachs, J. D. 1981. "The current account and macroeconomic adjustment in the 1970s". *Brooking Papers on Economic Activity*, No.1: 201-68.

[39] Schiere, R. and A. Rugamba. 2011. "Chinese Infrastructure Investments and African Integration". Working Paper Series, No. 127. Tunis: African Development Bank.

[40] Smith, D. 2011. "Shell accused of fuelling violence in Nigeria by paying rival militant gangs". The Guardian Online. http://www.guardian.co.uk/world/2011/oct/03/shell-accused-of-fuelling-nigeria-conflict. (Accessed: 2012/04/15).

[41] Sutton, G. D. 2005. "Potentially endogenous borrowing and developing country sovereign credit ratings". *FSI Occasional Paper*, No.5. Basel: Bank for International Settlements.

[42] Sy, A. N. R. 2002. "Emerging market bond spreads and sovereign credit ratings: reconciling market views with economic fundamentals". *Emerging Markets Review*, Vol. 3(2): 380-408.

[43] Uppsala Conflict Data Program. "World Map: Nigeria". http://www.ucdp.uu.se/gpdatabase/gpcountry.php?id=119. Uppsala University. (Accessed: 2012/04/05).

[44] Weisbrod, A. and J. Whalley. 2011. "The Contribution of Chinese FDI to Africas Pre Crisis Growth Surge". *NBER Working Paper 17544*. Washington, D.C.

[45] Woo, T., W. 2000. *"Coping with Accelerated Capital Flows from the Globalisation of Financial Markets"*. ASEAN Economic Bulletin.

[46] World Bank and IMF. 2001. *"The Challenge of Maintaining Long-Term External Debt Sustainability"*. Washington D.C.: The World Bank Group and International Monetary Fund.